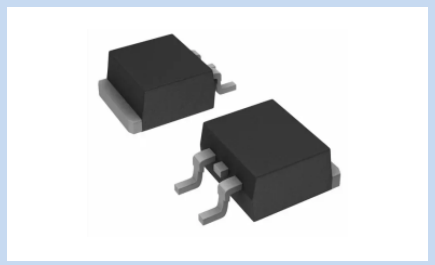
# N-Channel MOSFET
# 500V 4.1A 62.5W TO-252

MFT50N4A1T252

MERITEK

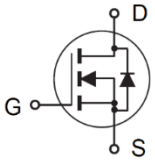
## FEATURE

- $R_{DS(ON)}$<1.8Ω, $V_{GS}$=10V, $I_D$=2.5A
- High Power and Current Handing Capability
- Super High Dense Cell Design for Extremely Low $R_{DS(ON)}$
- RoHS compliant.



## MECHANICAL DATA

- Case: TO-252 Package
- Terminals: Solderable per MIL-STD-750, Method 2026




RoHS

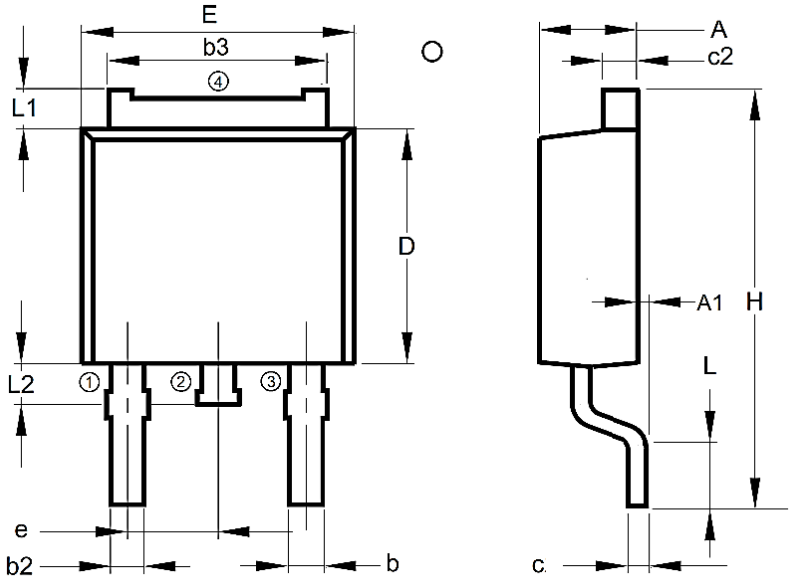
## MAXIMUM RATINGS

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 500 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±30 | V |
| Drain Current – Continuous | | $I_D$ | 4.1 | A |
| Drain Current – Pulsed | | $I_{DM}$ | 16.4 | A |
| Power Dissipation | $T_C$=25°C | $P_D$ | 62.5 | W |
| | Derate above 25°C | | 0.5 | W/°C |
| Thermal Resistance Junction to Ambient | | $R_{\theta JA}$ | 50 | °C/W |
| Thermal Resistance Junction to Case | | $R_{\theta JC}$ | 2 | °C/W |
| Operating Junction and Storage Temperature | | $T_J$, $T_{STG}$ | -55 to 150 | °C |

## DIMENSIONS

| Item | Min (mm) | Max (mm) |
|---|---|---|
| A | 2.20 | 2.40 |
| A1 | 0.45 | 0.89 |
| b | 0.50 | 0.90 |
| b1 | 4.95 | 5.59 |
| C | 0.40 | 0.61 |
| D | 5.40 | 6.63 |
| E | 6.05 | 7.10 |
| e | 1.98 | 2.59 |
| H | 8.80 | 10.6 |
| L | 0.25 | -- |
| L1 | 0.50 | 1.20 |
| L2 | 0.70 | 1.78 |

Note: 1: Gate, 2, 4: Drain, 3: Source

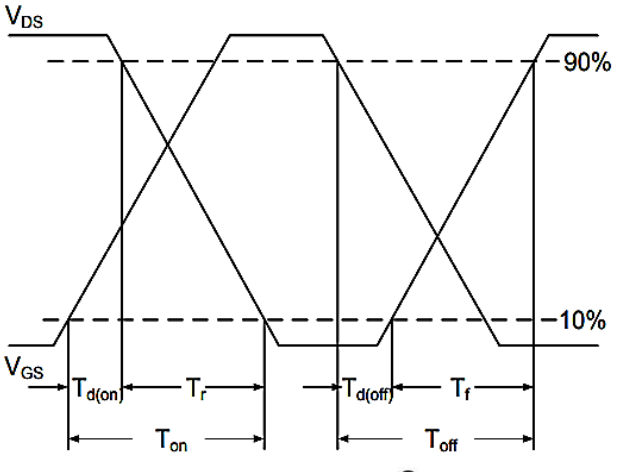


## ELECTRICAL CHARACTERISTICS

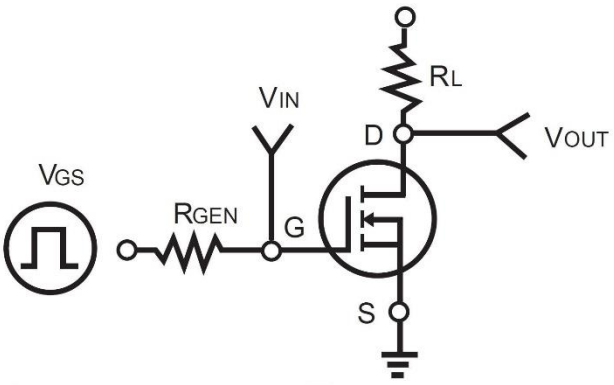
| Off Characteristics | Conditions | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | $BV_{DSS}$ | 500 | -- | -- | V |
| Drain-Source Leakage Current | $V_{DS}$=500V, $V_{GS}$=0V | $I_{DSS}$ | -- | -- | 1 | μA |
| Gate-Body Leakage Current, Forward | $V_{GS}$=30V, $V_{DS}$=0V | $I_{GSSF}$ | -- | -- | 100 | nA |
| Gate-Body Leakage Current, Reverse | $V_{GS}$=-30V, $V_{DS}$=0V | $I_{GSSR}$ | -- | -- | -100 | nA |
| **On Characteristics** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=2.5A | $R_{DS(ON)}$ | -- | 1.45 | 1.8 | Ω |
| Gate Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | $V_{GS(th)}$ | 2.0 | -- | 4.0 | V |
| **Dynamic Characteristics** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Total Gate Charge | $V_{DS}$=300V, $V_{GS}$=10V, $I_D$=2.5A | $Q_g$ | -- | 11 | -- | nC |
| Gate-Source Charge | | $Q_{gs}$ | -- | 3 | -- | nC |
| Gate-Drain Charge | | $Q_{gd}$ | -- | 2.5 | -- | nC |
| Turn-On Delay Time | $V_{DD}$=250V, $V_{GS}$=10V, $R_G$=25Ω, $I_D$=4.1A | $T_{d(on)}$ | -- | 23 | -- | ns |
| Rise Time | | $T_r$ | -- | 12 | -- | ns |
| Turn-Off Delay Time | | $T_{d(off)}$ | -- | 35 | -- | ns |
| Fall Time | | $T_f$ | -- | 12 | -- | ns |
| Input Capacitance | $V_{DS}$=25V, $V_{GS}$=0V, F=1MHz | $C_{iss}$ | -- | 635 | -- | pF |
| Output Capacitance | | $C_{oss}$ | -- | 80 | -- | pF |
| Reverse Transfer Capacitance | | $C_{rss}$ | -- | 15 | -- | pF |
| **Drain-Source Body Diode** | **Conditions** | **Symbol** | **Min** | **Typ.** | **Max** | **Unit** |
| Drain-Source Diode Forward Current | -- | $I_S$ | -- | -- | 4.1 | A |
| Diode Forward Voltage | $V_{GS}$=0V, $I_S$=4.1A | $V_{SD}$ | -- | -- | 1.5 | V |

**Note:**
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%
3. Guaranteed by design, not subject to production testing.
4. Limited only by maximum temperature allowed.
5. Pulse Width Limited by safe operating area.
6. L=25mH, $I_{AS}$=4.1A, $V_{DD}$=50V, $R_G$=25W, Starting $T_J$=25°C

**Switching Time Waveform**

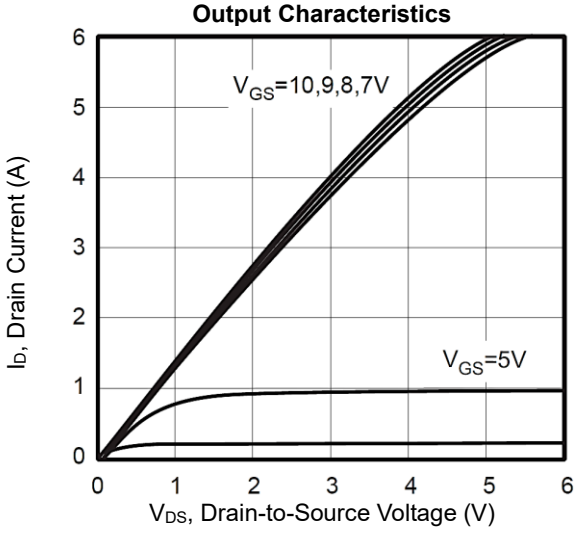



**Switching Test Circuit**

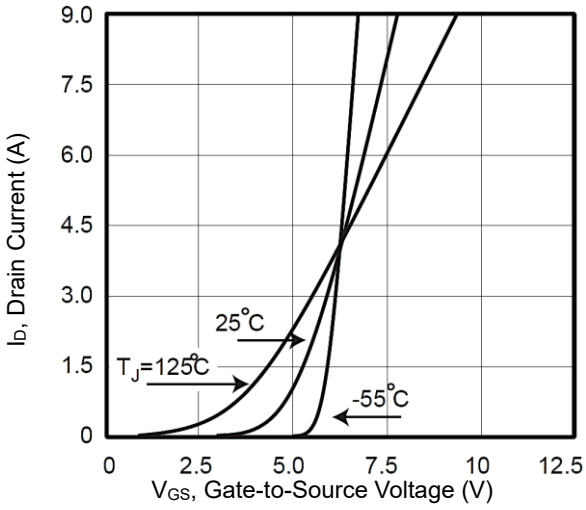


## CHARACTERISTIC CURVES

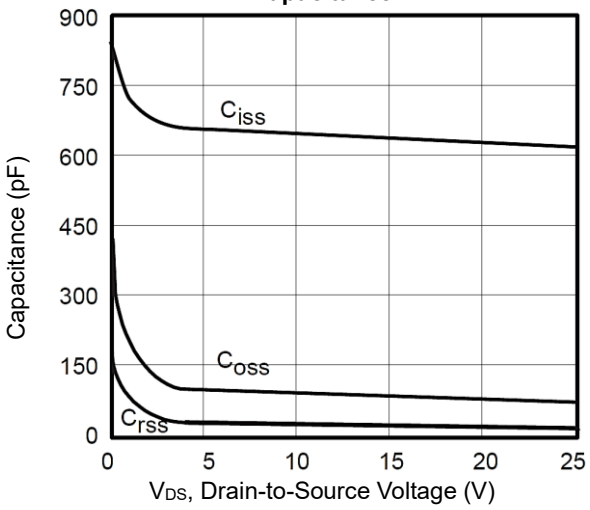
**Output Characteristics**



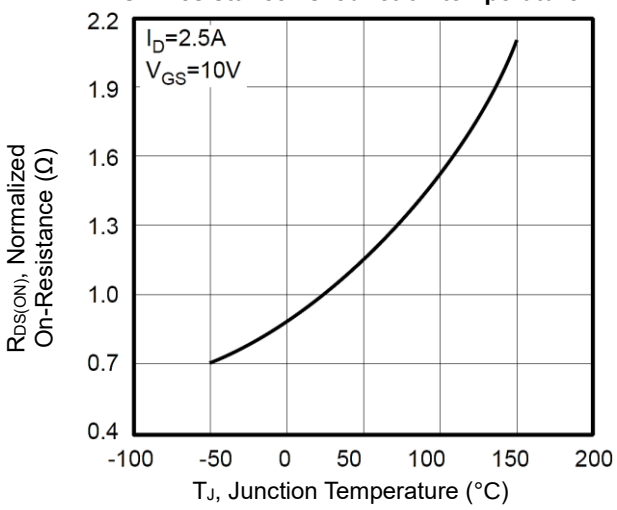

**Transfer Characteristics**



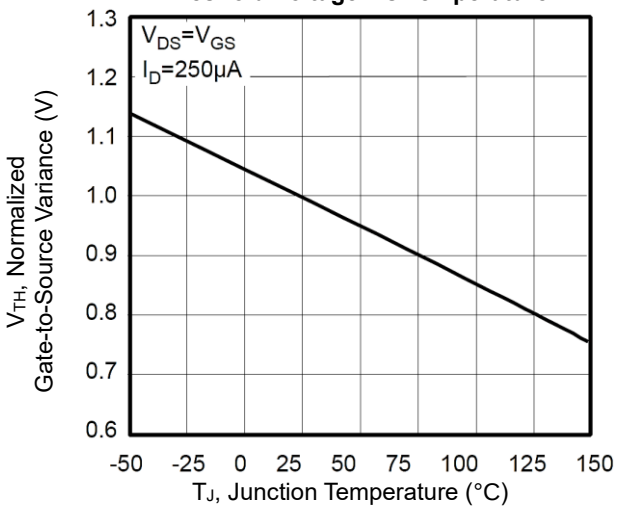

**Capacitance**



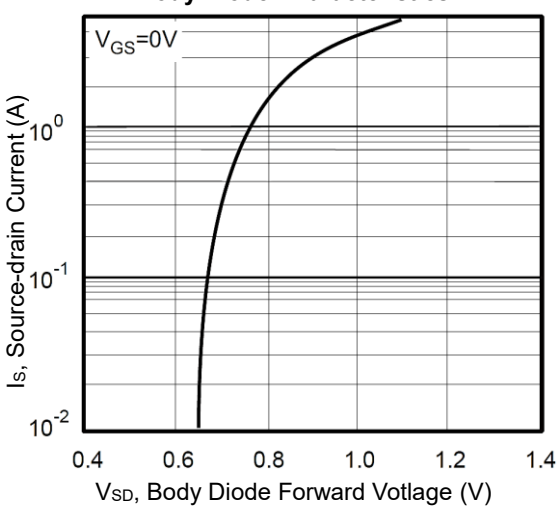

**On-Resistance vs. Junction temperature**




**Threshold Voltage vs Temperature**

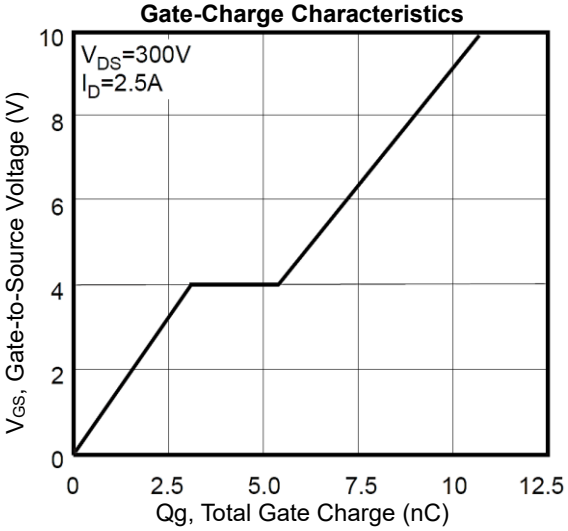



**Body Diode Characteristics**

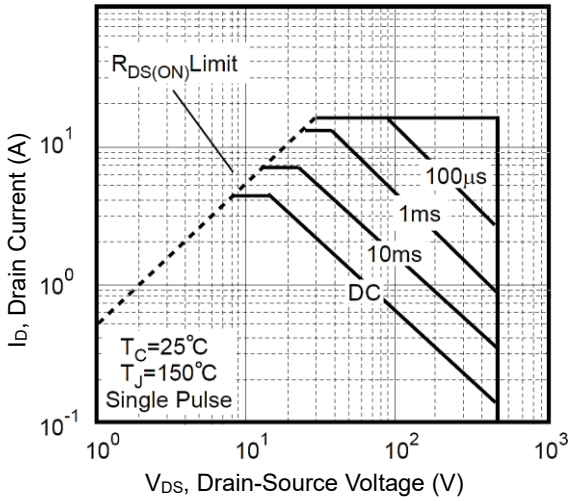


## CHARACTERISTIC CURVES

**Gate-Charge Characteristics**




**Maximum Safe Operating Area**




**Normalized Transient Thermal Impedance vs Pulse Width**